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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/088,192	03/14/2002	Randall Barbour	0887-4168	1513

23389 7590 07/27/2004

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EXAMINER	
DASTOURI, MEHRDAD	
ART UNIT	**PAPER NUMBER**
2623	

DATE MAILED: 07/27/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/088,192	BARBOUR, RANDALL	
	Examiner	Art Unit	
	Mehrdad Dastouri	2623	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,6-9 and 11-13* is/are rejected.

7)☒ Claim(s) *3-5, 10 and 14-16* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *4*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Specification

1. This application does not contain an abstract of the disclosure as required by 37 CFR 1.72(b). An abstract on a separate sheet is required.

Claim Objection

2. Claims 3, 5, 11, 14 and 16 are objected to because of the following informalities:

Since different types of fonts (bold, italic, etc.) have been used for identifying the variables, the variable symbols should be shown consistently in the formulas and their corresponding description in the body of claims (i.e., if a variable is shown in italic and/or bold in a formula, it should be also shown in italic and/or bold in the body of claims.).

The subscripts "*i*" and "*j*", and their ranges should be identified in the claims.

In Claims 3 and 14, $\delta \mathrm{I}_r$ should be defined.

In Claims 3 and 14, $\mathbf{W'}_r$ should be corrected to $\mathbf{W}_r$.

In Claims 5 and 16, $\delta \mathrm{I'}_r$ and $\mathbf{W'}_r$ should be defined.

In Line 1 of Claim 11, "A" should be corrected to "the".

Appropriate correction is required.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

4. Claims 1, 2, 6-8 and 11-13 are rejected under 35 U.S.C. 102(e) as being anticipated by Colak (U.S. 5,903,357).

Regarding Claim 1, Colak discloses a method for imaging of the properties of a scattering target medium, comprising:

generating a first vector of measured data and a second vector of measured data (Column 5, Formulas (1) and (2), Intensities of photon fluences at different points of turbid medium), the first vector of measured data being indicative of energy emerging from a target medium, the second vector of measured data being indicative of energy emerging from a target medium, the emerging energy substantially originating from at least one source directing the energy into the target medium (Figures 8 and 10; Column 2, Lines 5-35; Column 5, Lines 3-33);

normalizing the first and second vectors of measured data (Column 3, Lines 4-19); and

solving a modified perturbation formulation of the radiation transport inverse problem for a relative change between a known property of a reference medium and the corresponding unknown property of a target medium, wherein the modified perturbation equation relates the normalized measured data and a vector of reference data for the known reference medium to the relative change in the property, the vector of reference data being indicative of energy emerging from the known reference medium (Column 2, Lines 5-40. A weighting function is defined as a function giving a dependency of the

strength of an object of a position r, which strength introduces a normalized intensity change at a detector position r_d in light from a source at position r_s. The weighting function W is defined as the inverse function of the perturbation function P, so W = 1/P.).

Regarding Claim 2, Colak further discloses the method of Claim 1 wherein the normalization of the first and second vectors of measured data comprises determining the difference between the first and second vectors of measured data relative to the second vector of measured data (Column 3, Lines 4-28).

Regarding Claim 6, Colak further discloses the method of Claim 1 wherein the property is at least one of an absorption coefficient and a scattering coefficient (Column 1, Lines 39-42; Column 9, Lines 10-16).

Regarding Claim 7, Colak further discloses the method of Claim 1 wherein the first vector of measured data and second vector of measured data are obtained from one target (Figure 1; turbid medium; Column 2, Lines 5-40).

Regarding Claim 8, Colak further discloses the method of Claim 1 wherein the first vector of measured data is obtained from a first target and the second vector of measured data is obtained from a second target (Column 2, Lines 5-40: Column 7, Lines 54-67, Column 8, Lines 1-64. First and second vectors of measured data are obtained at different pixels of turbid medium.).

Regarding Claim 11, Colak further discloses the method of Claim 1 further comprising generating an image representing the cross-sectional relative changes in the property (Figures 1-7).

With regards to Claim 12, arguments analogous to those presented for Claim 1 are applicable to Claim 12.

With regards to Claim 13, arguments analogous to those presented for Claim 2 are applicable to Claim 13.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Colak (U.S. 5,903,357) in view of Alfano et al (U.S. 5,625,458).

Regarding Claim 9, Colak does not specifically disclose the method of Claim 1 wherein the first vector of measured data is obtained at a first instant in time and the second vector of measured data is obtained at a second instant in time.

Alfano disclose a method and system for imaging objects in turbid media by obtaining plurality of vectors of measured data wherein the first vector of measured data is obtained at a first instant in time and the second vector of measured data is obtained at a second instant in time (Column 10, Lines 57-67).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Colak's invention according to the teachings of Alfano et al to obtain the first vector of measured data at a first instant in time and the second vector of measured data at a second instant in time because it will improve the accuracy

and reliability of the imaging system by considering probable changes in the turbid medium at different time durations.

Allowable Subject Matter

7. Claims 3- 5, 10 and 14-16 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims, and overcome the informalities set forth in the Office Action.

Claim 3 of the instant invention recites the method of claim 1 wherein the modified perturbation equation has the following form:

$$(\delta I_r)_i = [(I_i - (I_o)_i) / (I_o)_i)] (I_r)_i \text{ ; and}$$

$$\mathbf{W}_r \cdot \delta \mathbf{x} = \delta I_r ,$$

where $\delta \mathbf{x}$ is a vector of the relative changes between a known property of the reference medium and the corresponding unknown property of a target medium, for corresponding volume elements of the reference medium and the target medium, the volume elements being an imaginary grid of contiguous regions forming a representation of the target medium and reference medium, $\mathbf{W}_r$ is a weight matrix describing the influence that each of a plurality of volume elements of the reference medium has on energy emerging at a point on the reference medium, I_r is the vector of reference data indicative of energy emerging from the reference medium, I is the first vector of measured data and I_o is the second vector of measured data.

Claim 4 of the instant invention recites the method of Claim 1 wherein the normalization of the first and second sets of measured data comprise determining the

natural logarithm of the quotient of the first set of measured data and the second set of measured data.

Claim 5 of the instant invention recites the method of Claim 1 wherein the modified perturbation equation has the following form:

$$(\delta I')_i = \ln (I_i / (I_o)_i));$$

$$(\mathbf{W'}_r)_{ij} = (\mathbf{W}_r)_{ij} / (I_r)_i ;$$

$$\delta I' = \mathbf{W'}_r \delta x$$

where δx is a vector of the relative changes between a known property of the reference medium and the corresponding unknown property of a target medium for corresponding volume elements of the reference medium and the target medium, the volume elements being an imaginary grid of contiguous, nonoverlapping regions forming a representation of the target medium and reference medium, Wr is a weight matrix describing the influence that each of a plurality of volume elements of the reference medium has on energy emerging at a point on the reference medium, where I_r is the vector of reference data indicative of energy emerging from the reference medium, I is the first vector of measured data and I_o is the second vector of measured data.

Claims 14-16 recite the corresponding system for the methodology Claims 3-5, respectively, and are therefore allowable.

Claim 10 of the instant invention recites the method of Claim 1 wherein the first vector of measured data is obtained at a first instant in time and the second vector of measured data is a time averaged mean of a plurality of measurements.

The features identified are neither discussed nor suggested by the prior arts of record.

Contact Information

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mehrdad Dastouri whose telephone number is (703) 305-2438. The examiner can normally be reached on Monday to Friday from 8:00 a.m. to 4:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au can be reached on (703) 308-6604. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MEHRDAD DASTOURI
PRIMARY EXAMINER

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Primary Examiner
Group Art Unit 2623
July 24, 2004